

TEST REPORT



CTK Co., Ltd.

(Ho-dong), 113, Yejik-ro, Cheoin-gu,
Yongin-si, Gyeonggi-do, Korea
Tel: +82-31-339-9970
Fax: +82-31-624-9501

Report No.:
CTK-2019-02553
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1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, suwon-si, Gyeonggi-do, 16677, Republic of Korea
- Date of Receipt : 2019-06-17

2. Manufacturer

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, suwon-si, Gyeonggi-do, 16677, Republic of Korea

3. Use of Report : For Type Certification

4. Test Sample / Model: Wi-Fi/BT Transceiver / WCP730M

5. Date of Test : 2019-07-05

6. Test Standard(method) used : Article 2, Clause 1, Item 19 No. 88 appended table 43

7. Testing Environment: Temp.: (23 ± 1) °C, Humidity: (49 ± 3) % R.H.

8. Test Results : Compliance

The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This Test Report cannot be reproduced, except in full.

Affirmation	Tested by	Technical Manager
	Je-Guk, Ryu: (Signature)	Won-Jae, Hwang: (Signature)

2019-07-10

Republic of KOREA **CTK Co., Ltd.**



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REPORT REVISION HISTORY

Date	Revision	Page No
2019-07-10	Issued (CTK-2019-02553)	all

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1. General Product Description

1.1 Client Information

Company	Samsung Electronics Co., Ltd.
Contact Point	129, Samsung-ro, Yeongtong-gu, suwon-si, Gyeonggi-do, 16677, Republic of Korea
Contact Person	Name : Minhyung Cho E-mail : mh719.cho@samsung.com Tel : +82-31-277-2688

1.2 Product Information

Product Description	Wi-Fi/BT Transceiver
Model name	WCP730M
Antenna type	Metal Invertes Antenna
Antenna gain	-4.60 dBi
Operating Frequency	2 402 MHz - 2 480 MHz
Measurement RF Output Power	1Mbps : 1.937 mW 2Mbps : 1.544 mW
Number of channels	40
Channel Spacing	2 MHz
Type of Modulation	GFSK
Power Source	DC 5 V

1.3 Peripheral Devices

Device	Manufacturer	Model No.	Serial No.
Note Computer	HP	15-bs563TU	CND7253R5S
AC/DC Adapter	HP	HSTNN-CA40	-

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2. Facility and Accreditations

2.1 Test Facility

The measurement facility is located at (Ho-dong), 113, Yejik-ro, Cheoin-gu, Yong-in-si, Gyeonggi-do, Korea.

2.2 Laboratory Accreditations and Listings

Country	Agency	Registration Number
USA	FCC	805871
CANADA	ISED	8737A-2
JAPAN	VCCI	C-986 T-1843 R-3627 G-387
KOREA	NRRA	KR0025

2.3 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

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2.4 Measurement equipment list

	Name of Equipment	Manufacturer	Model No.	Serial No.	Cal. Authority	Cal. Method	Cal Date	Due Date
1	Signal Analyzer	Agilent	N9020A	MY48011598	SICT Co., Ltd.	(c)	2018-10-25	2019-10-25
2	Signal Generator	Rohde & Schwarz	SMB100A	175528	SICT Co., Ltd.	(c)	2018-10-24	2019-10-24
3	DC Power Supply	HP	6612C	US37462767	SICT Co., Ltd.	(c)	2018-12-26	2019-12-26
4	POWER SENSOR	HP	8487A	3318A03524	SICT Co., Ltd.	(c)	2019-01-28	2020-01-28
5	EPM Series Power Meter	HP	E4418A	GB38272734	SICT Co., Ltd.	(c)	2018-10-24	2019-10-24

Note : Cal. Method

- Calibration conducted by the National Institute of Information and Communications Technology~NICT~ or a designated calibration agency under Article 102-18 paragraph (1)~ Telecom Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc~.
- Correction conducted pursuant to the provisions of Article 135 or Article 144 of the Measurement Law (Law No. 51 of 1992)~Japan Calibration Service System~
- Calibration conducted in foreign countries, which shall be equivalent to the calibration conducted by the NICT or a designated calibration agency under Article 102-18 paragraph (1)~ Telecom Engineering Center, Intertek Japan K.K., Keysight Technologies, Inc~.
- Calibration conducted by using other equipment that listed above from a) to c)

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2.5 Maximum Measurement Uncertainty

The value of the measurement uncertainty for the measurement of each parameter.

Coverage factor $k = 2$, Confidence levels of 95 %

Description	Uncertainty
Conducted RF Output Power	1.5 dB
Spurious emissions(Conducted)	1.5 dB
Temperature	1 °C
Humidity	3 %



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2.6 Test Setup photo



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3. Test Results

3.1 BLE 5.0 (1Mbps)

Declaration Output Power	2.800	mW/MHz
	4.472	dBm/MHz
E.I.R.P.	-0.128	dBm/MHz

Transmission Time	ON TIME	2.121	msec
	OFF TIME	0.366	msec
	Ratio	0.853	-
Packet Type (Mode)		Not Applicable	mode
Transmit Speed		Not Applicable	MHz

Channel Number		Ch.	0	19	39	Result	Limit
Measurement Frequency		MHz	2402	2440	2480		
Frequency Measurements		MHz	2401.976335	2439.975711	2479.975165	PASS	-
Frequency Tolerance		ppm	-9.85221	-9.95451	-10.01411	PASS	$\pm 50 \times 10^{-6}$ (50ppm)
Occupied Bandwidth		MHz	1.22	1.22	1.22	PASS	26MHz or below
Spread Bandwidth		MHz	0.82	0.82	0.82	PASS	500kHz or more
RF Output Power		mW	1.862667	1.937025	1.906054	PASS	10mW or below
RF Output Power Tolerance		%	-33.476194	-30.820553	-31.926656	PASS	+20 to -80%
Unwanted (Spurious) Emissions	30 to 2387MHz	uW/MHz	0.002829	0.002129	0.002145	PASS	2.5uW/MHz or below
		MHz	2321.000	2280.930	2356.360	-	-
	2387 to 2400MHz	uW/MHz	0.480286	0.001690	0.001666	PASS	25uW/MHz or below
		MHz	2399.990	2395.840	2396.810	-	-
	2483.5 to 2496.5MHz	uW/MHz	0.001783	0.001631	0.009386	PASS	25uW/MHz or below
		MHz	2488.480	2491.300	2484.050	-	-
	2496.5 to 12500MHz	uW/MHz	0.119371	0.161585	0.100624	PASS	2.5uW/MHz or below
		MHz	9608.990	9759.040	9919.100	-	-
Secondary emitted radio wave strength	30 to 1000MHz	nW	0.012621	0.011176	0.013308	PASS	4nW or below
		MHz	800.180	532.460	746.830	-	-
	1000 to 10000MHz	nW	0.301439	0.384238	0.317322	PASS	20nW or below
		MHz	3907.000	2458.000	3907.000	-	-
	10000 to 12500MHz	nW	0.209122	0.230197	0.210572	PASS	20nW or below
		MHz	12152.500	12190.000	12050.000	-	-

Note : Output Power = Power meter power (mW) / Duty cycle



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3.2 BLE 5.0 (2Mbps)

Declaration Output Power	2.200	mW/MHz
	3.424	dBm/MHz
E.I.R.P.	-1.176	dBm/MHz

Transmission Time	ON TIME	0.063	msec
	OFF TIME	1.068	msec
	Ratio	0.808	-
Packet Type (Mode)		Not Applicable	mode
Transmit Speed		Not Applicable	MHz

Channel Number		Ch.	0	19	39		
Measurement Frequency		MHz	2402	2440	2480	Result	Limit
Frequency Measurements		MHz	2401.976296	2439.975642	2479.975001	PASS	-
Frequency Tolerance		ppm	-9.86844	-9.98279	-10.08024	PASS	±50×10 ⁻⁶ (50ppm)
Occupied Bandwidth		MHz	2.16	2.16	2.16	PASS	26MHz or below
Spread Bandwidth		MHz	1.37	1.37	1.37	PASS	500kHz or more
RF Output Power		mW	1.488201	1.544051	1.533422	PASS	10mW or below
RF Output Power Tolerance		%	-32.354502	-29.815873	-30.299017	PASS	+20 to -80%
Unwanted (Spurious) Emissions	30 to 2387MHz	uW/MHz	0.002082	0.002315	0.002108	PASS	2.5uW/MHz or below
		MHz	2365.790	2141.870	2379.930	-	-
	2387 to 2400MHz	uW/MHz	12.379412	0.001558	0.001845	PASS	25uW/MHz or below
		MHz	2399.990	2392.100	2399.580	-	-
	2483.5 to 2496.5MHz	uW/MHz	0.001857	0.001919	0.012526	PASS	25uW/MHz or below
		MHz	2485.370	2489.320	2483.510	-	-
	2496.5 to 12500MHz	uW/MHz	0.114736	0.160916	0.103657	PASS	2.5uW/MHz or below
		MHz	9608.990	9759.040	9919.100	-	-
Secondary emitted radio wave strength	30 to 1000MHz	nW	0.013268	0.013440	0.012930	PASS	4nW or below
		MHz	789.510	952.470	992.240	-	-
	1000 to 10000MHz	nW	0.335815	0.334272	0.354079	PASS	20nW or below
		MHz	3907.000	3907.000	3907.000	-	-
	10000 to 12500MHz	nW	0.216721	0.232113	0.245188	PASS	20nW or below
		MHz	12080.000	12232.500	12167.500	-	-

Note : Output Power = Power meter power (mW) / Duty cycle



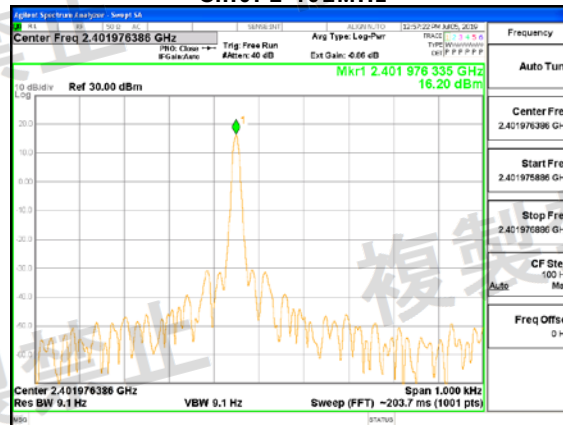
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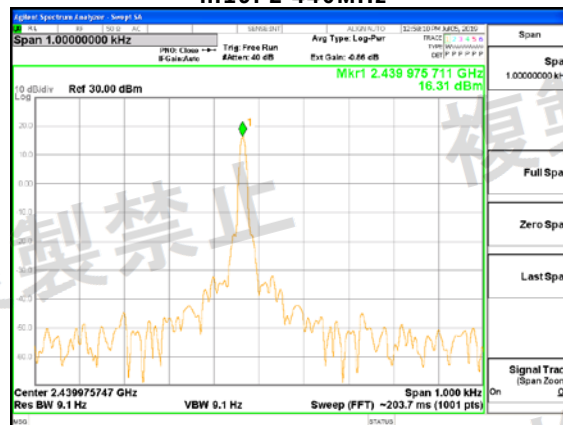
APPENDIX A – BLE 5.0 (1Mbps)

Frequency tolerance

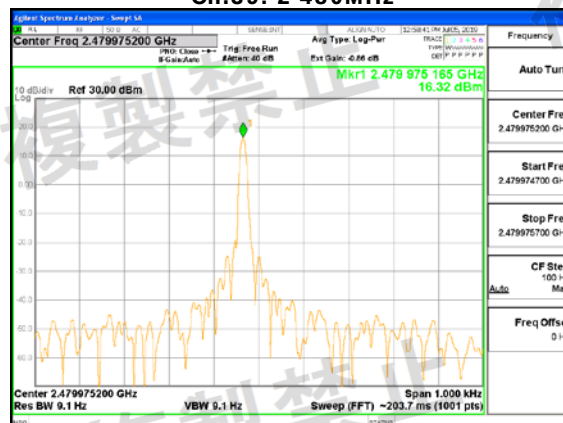
Ch.0: 2 402MHz



h.19: 2 440MHz



Ch.39: 2 480MHz



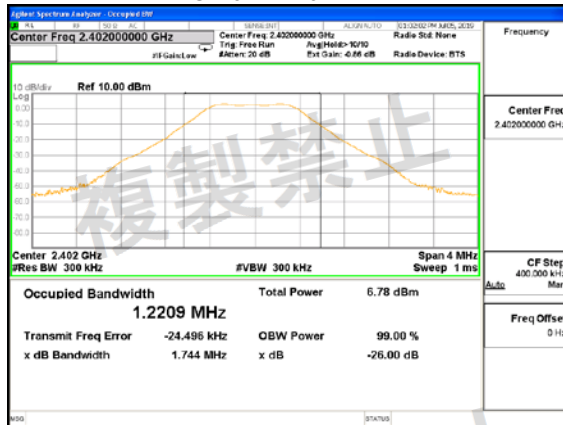


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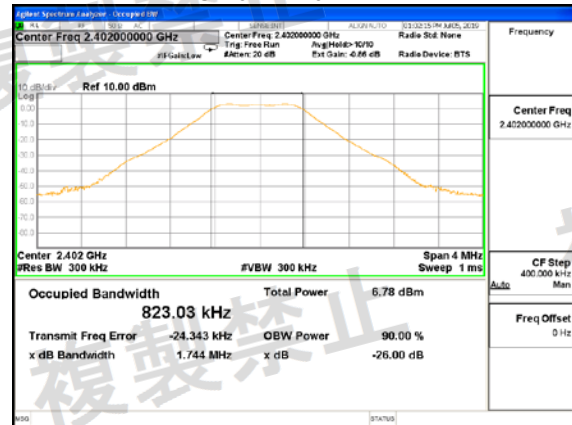
Occupied bandwidth

Ch.0 : 2 402MHz

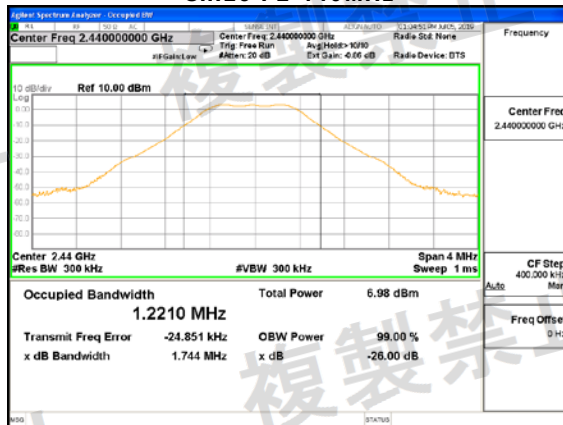


Spread bandwidth

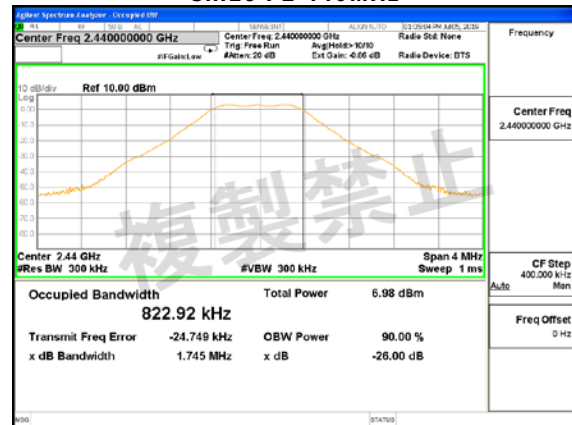
Ch.0 : 2 402MHz



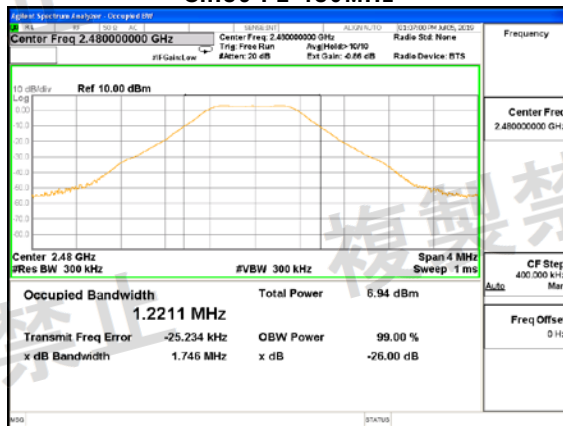
Ch.19 : 2 440MHz



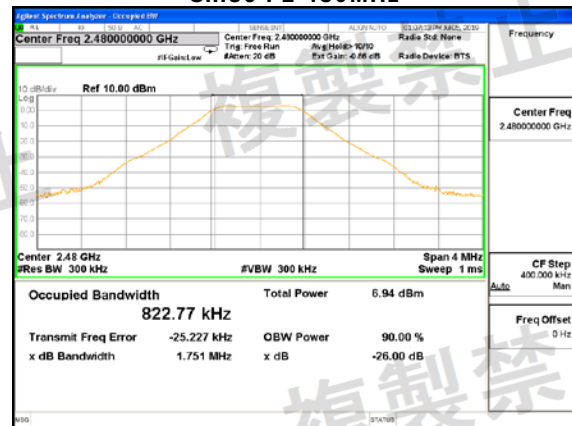
Ch.19 : 2 440MHz



Ch.39 : 2 480MHz



Ch.39 : 2 480MHz





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RF output power

Ch. 0: 2 402MHz



Ch.19: 2 440MHz



Ch.39: 2 480MHz

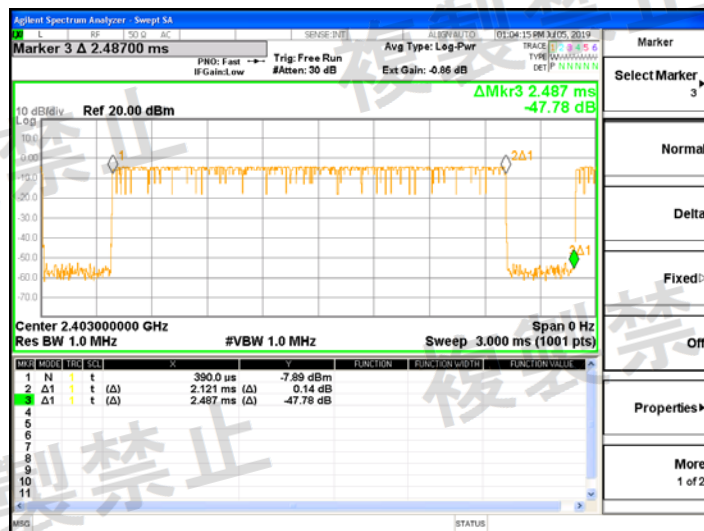




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ON/OFF time





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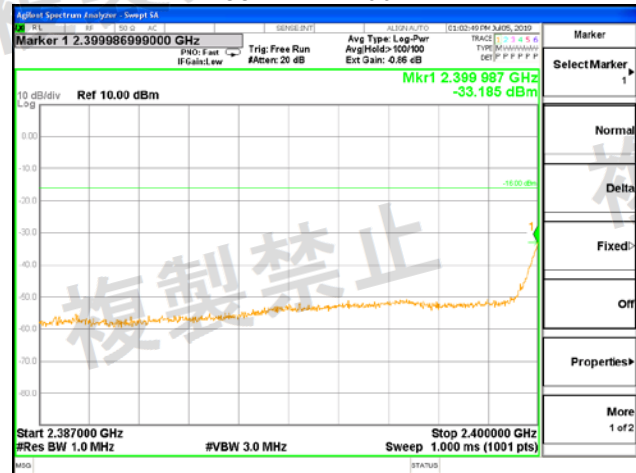
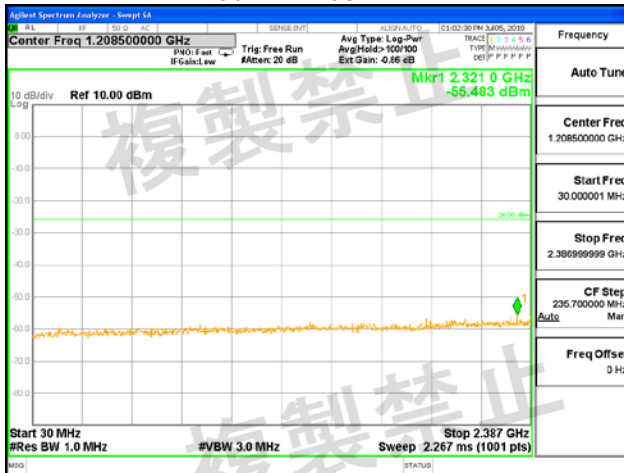
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Unwanted(Spurious) emission

Ch.0: 2402MHz

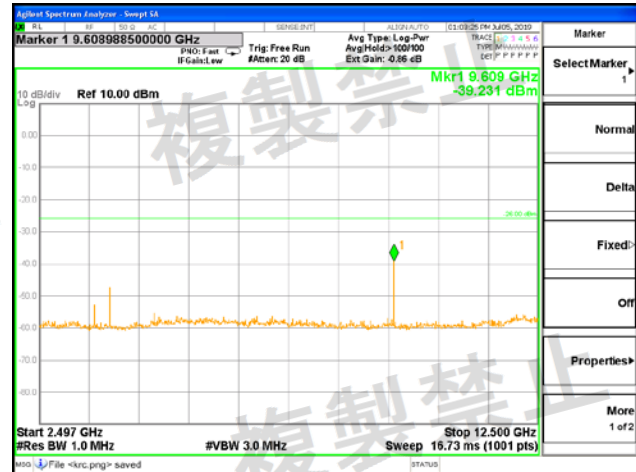
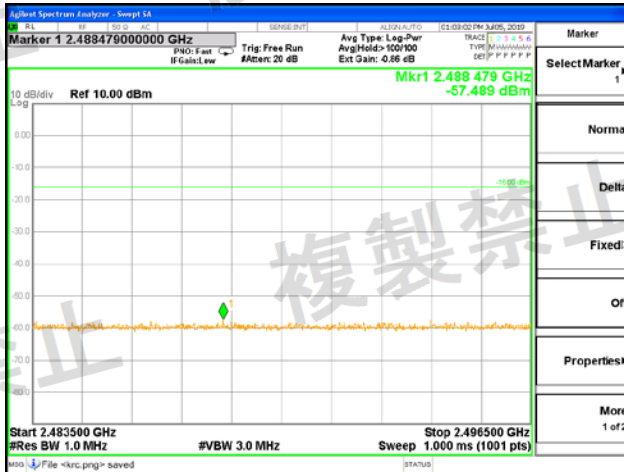
30MHz-2387MHz

2387MHz-2400MHz



2483.5MHz-2496.5MHz

2496.5MHz-12500MHz





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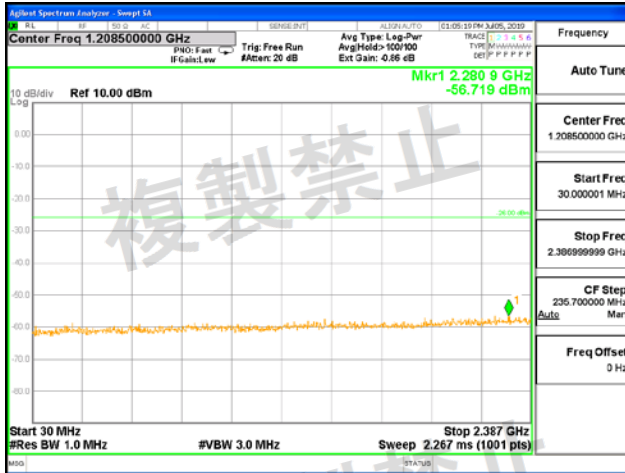
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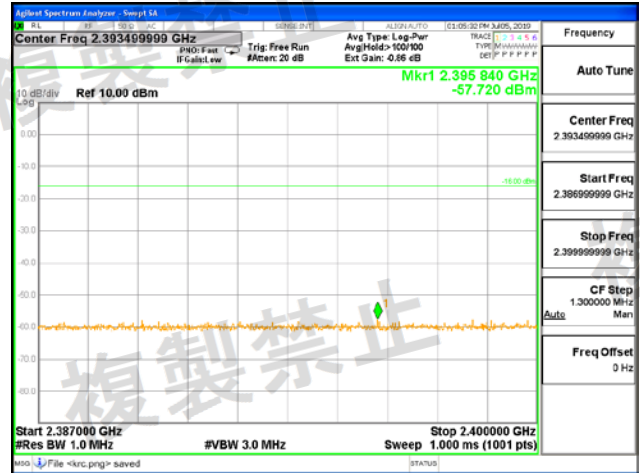
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Ch.19: 2440MHz

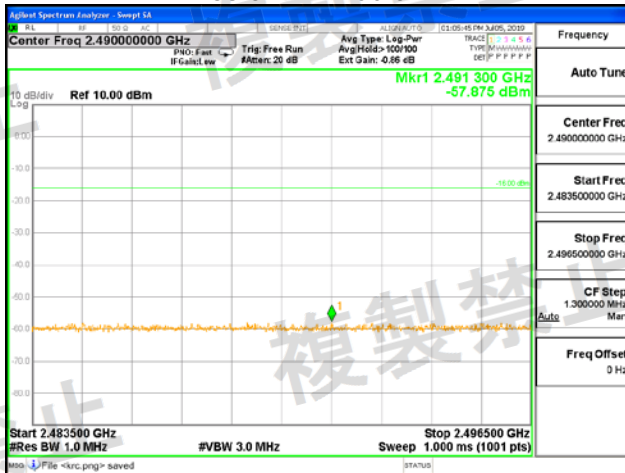
30MHz-2387MHz



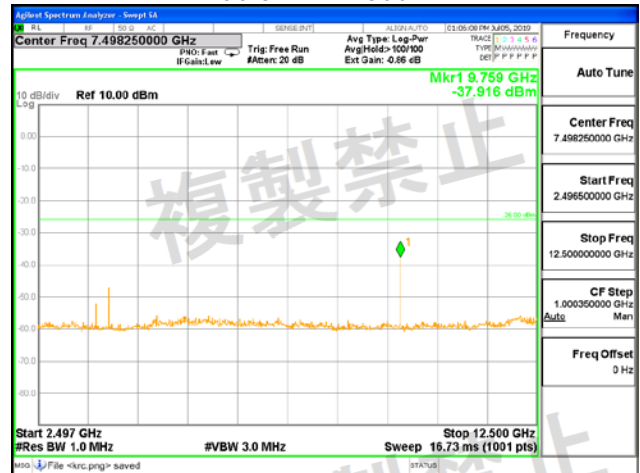
2387MHz-2400MHz



2483.5MHz-2496.5MHz



2496.5MHz-12500MHz





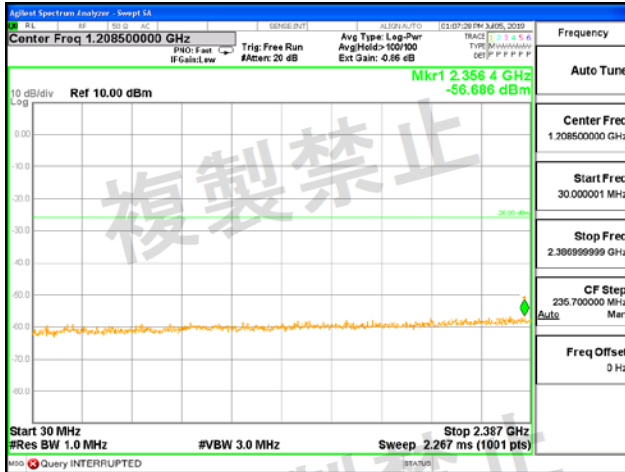
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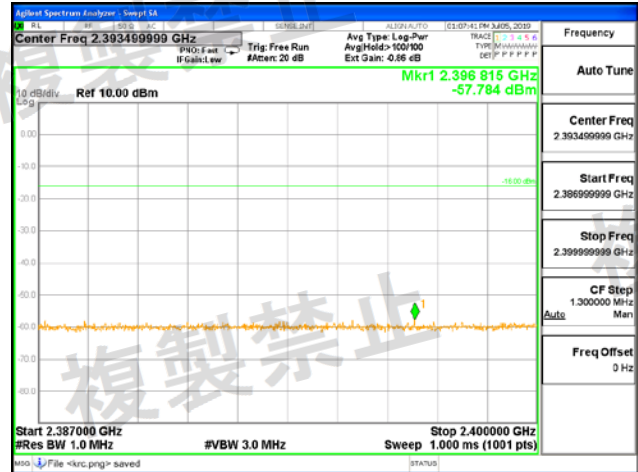
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Ch.39: 2480MHz

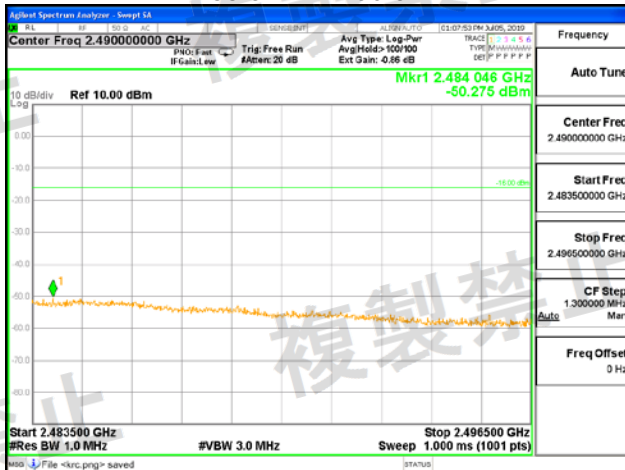
30MHz-2387MHz



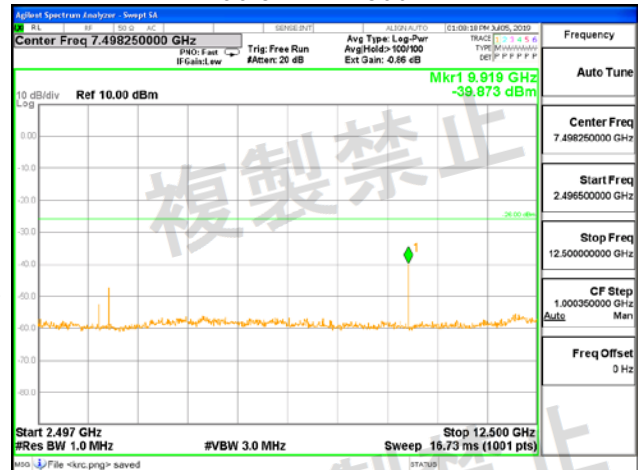
2387MHz-2400MHz



2483.5MHz-2496.5MHz



2496.5MHz-12500MHz





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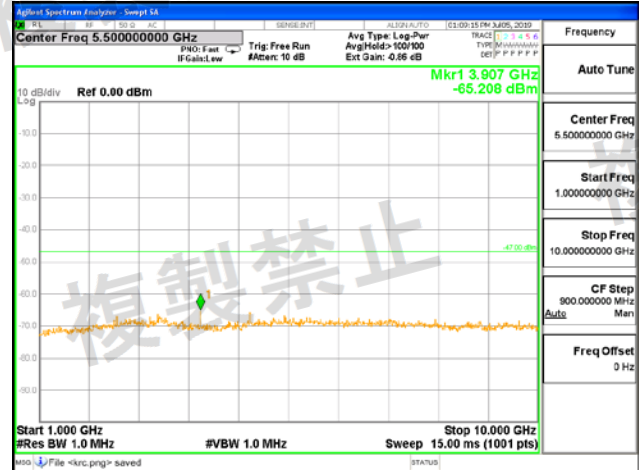
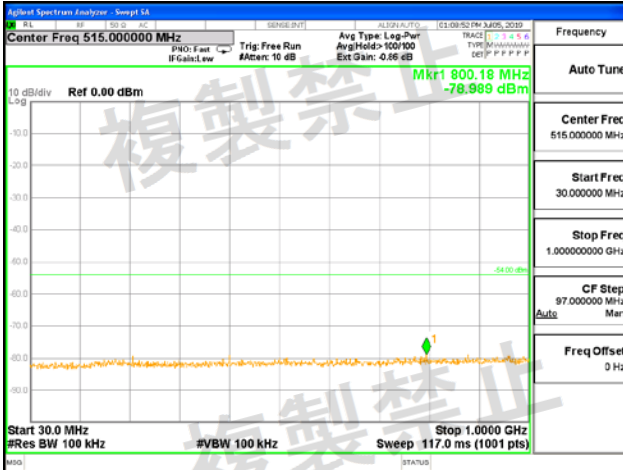
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Secondary emitted radio wave strength

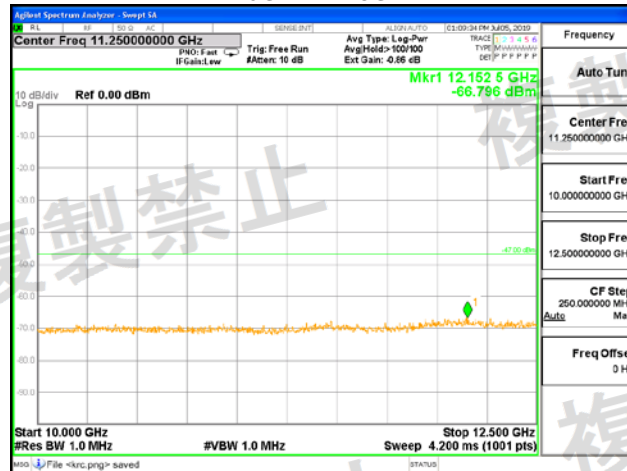
Ch.0: 2402MHz

30MHz-1GHz

1GHz-10GHz



10GHz-12.5GHz





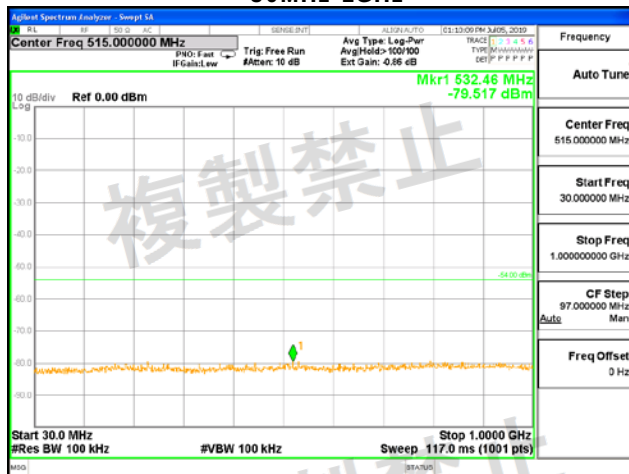
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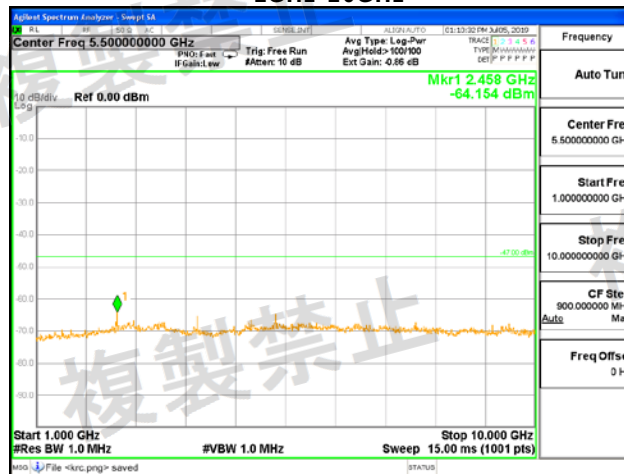
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Ch.19: 2440MHz

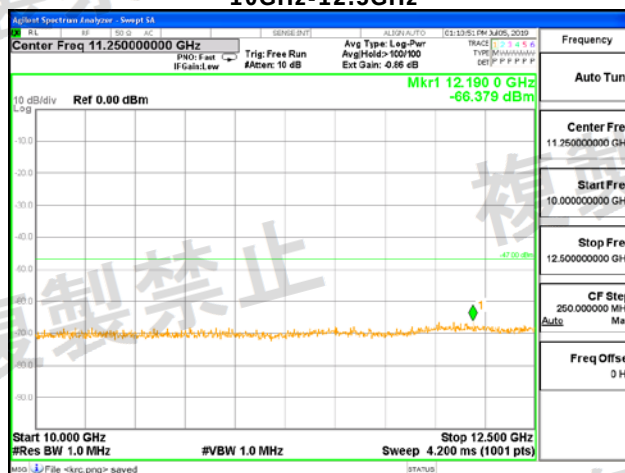
30MHz-1GHz



1GHz-10GHz



10GHz-12.5GHz





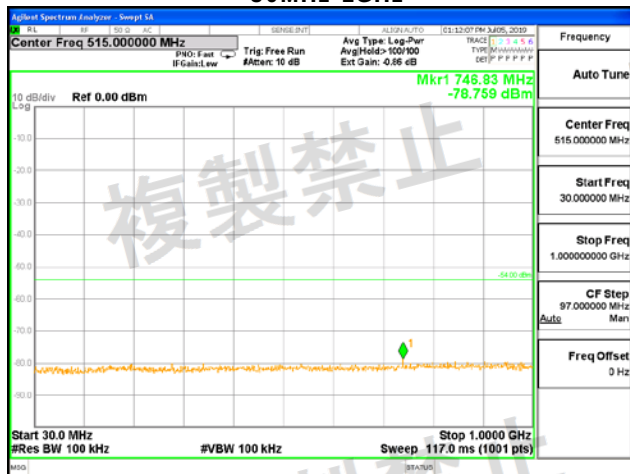
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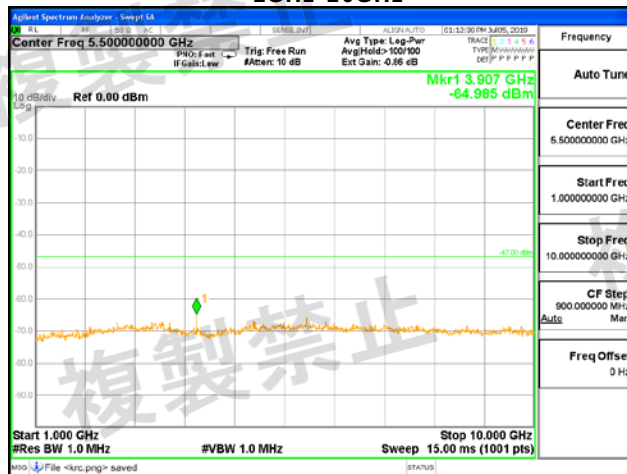
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Ch.39: 2480MHz

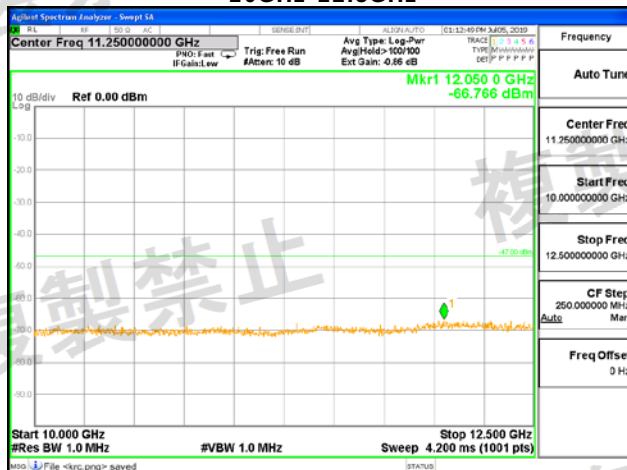
30MHz-1GHz



1GHz-10GHz



10GHz-12.5GHz





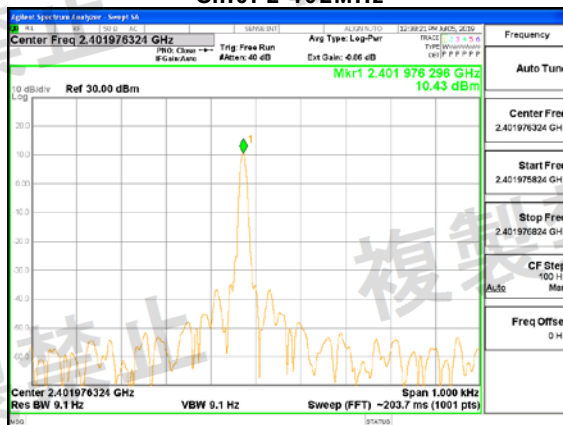
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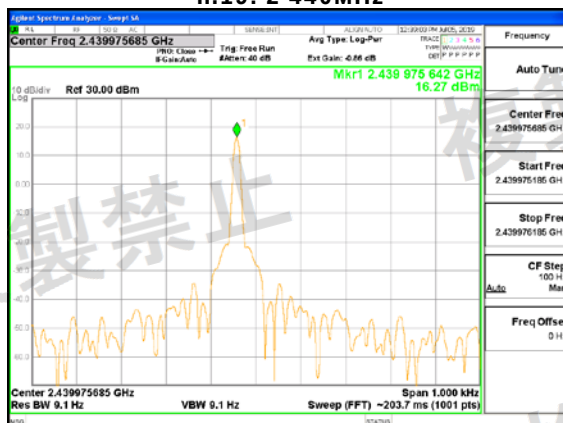
APPENDIX B – BLE 5.0 (2Mbps)

Frequency tolerance

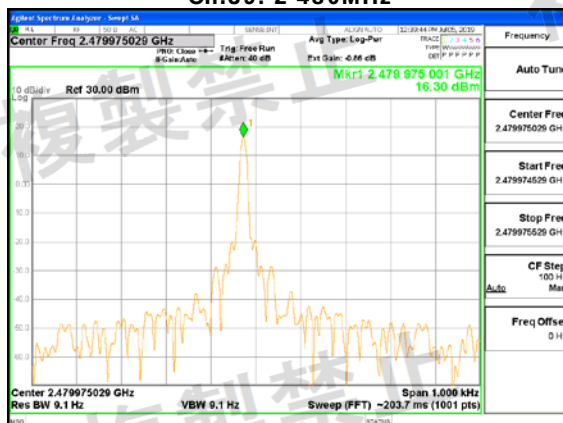
Ch.0: 2 402MHz



h.19: 2 440MHz



Ch.39: 2 480MHz



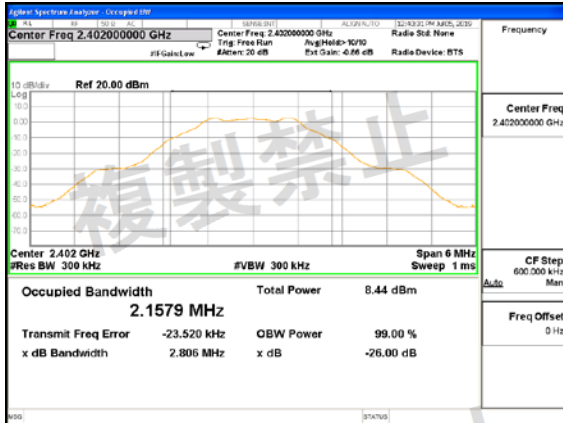


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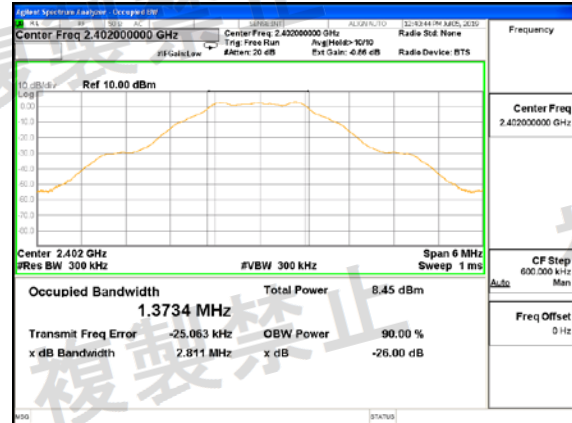
Occupied bandwidth

Ch.0 : 2 402MHz

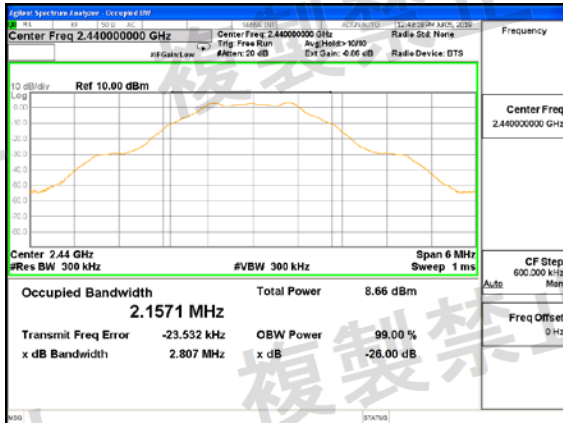


Spread bandwidth

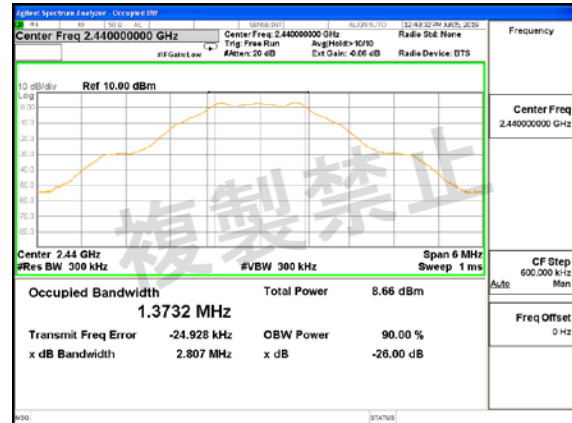
Ch.0 : 2 402MHz



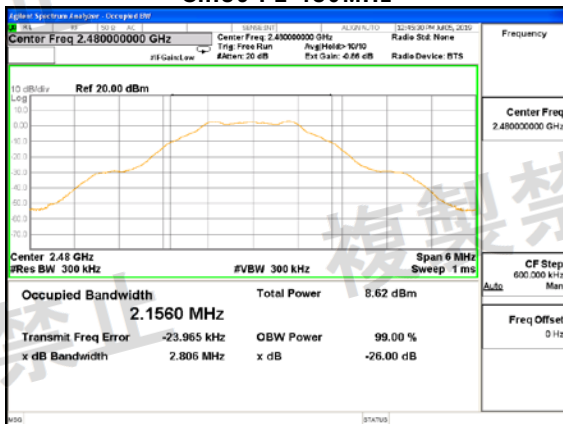
Ch.19 : 2 440MHz



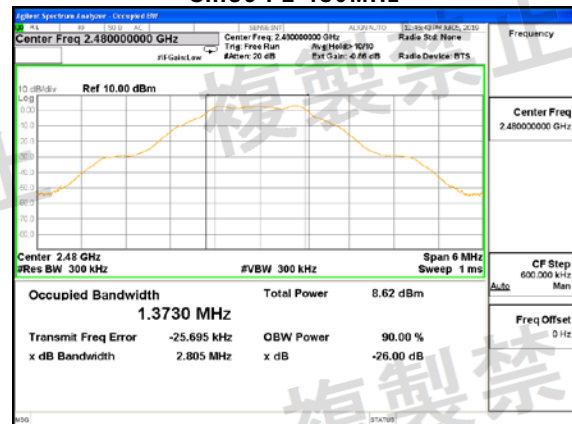
Ch.19 : 2 440MHz



Ch.39 : 2 480MHz



Ch.39 : 2 480MHz





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RF output power

Ch. 0: 2 402MHz



Ch.19: 2 440MHz



Ch.39: 2 480MHz

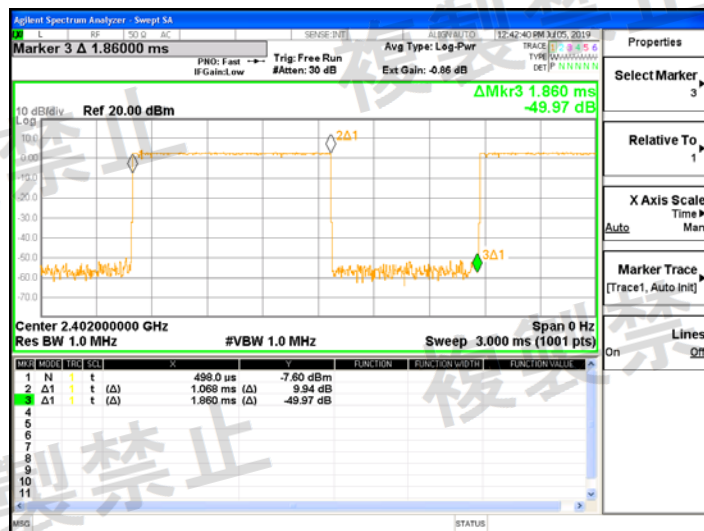




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ON/OFF time





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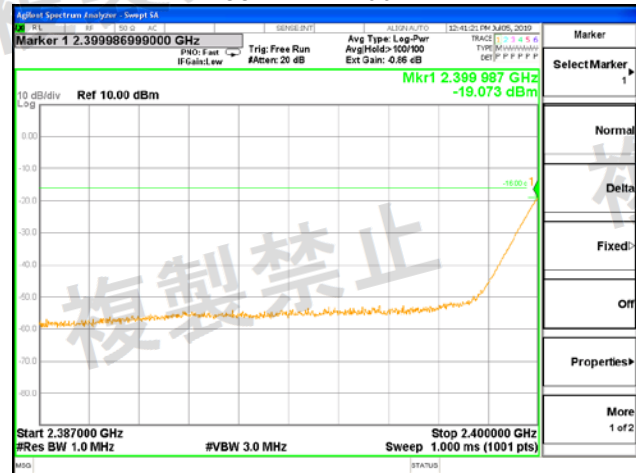
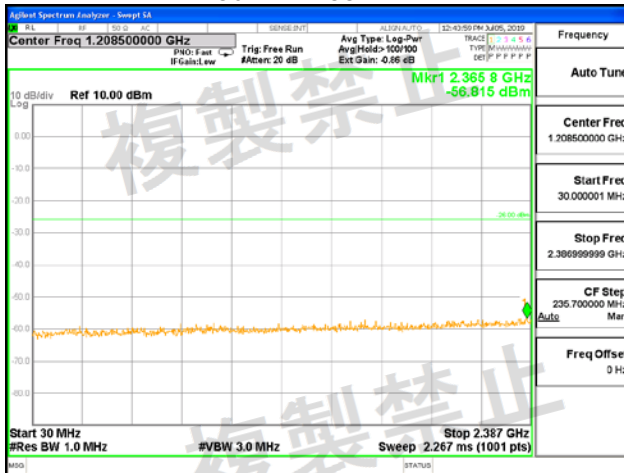
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Unwanted(Spurious) emission

Ch.0: 2402MHz

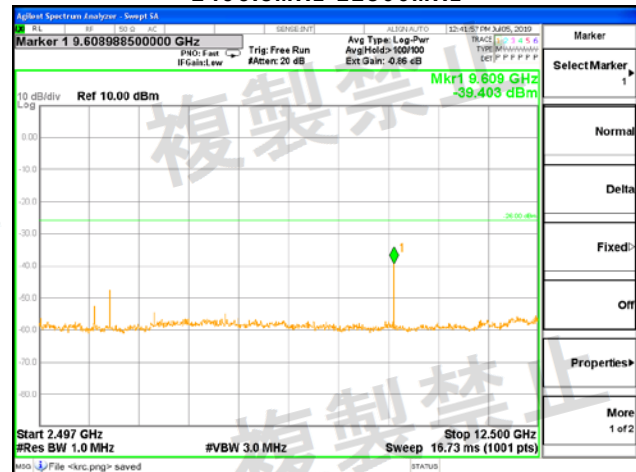
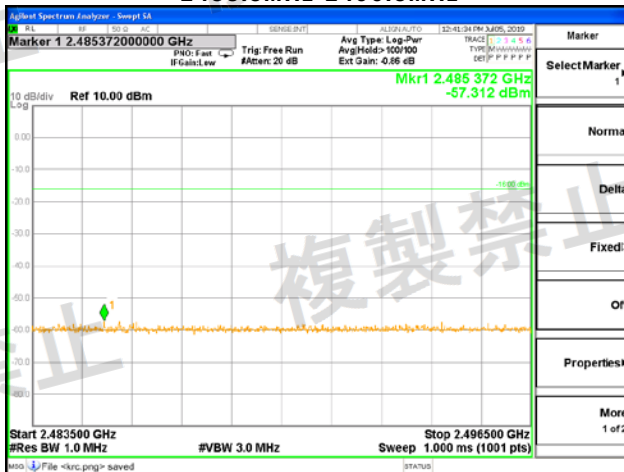
30MHz-2387MHz

2387MHz-2400MHz



2483.5MHz-2496.5MHz

2496.5MHz-12500MHz





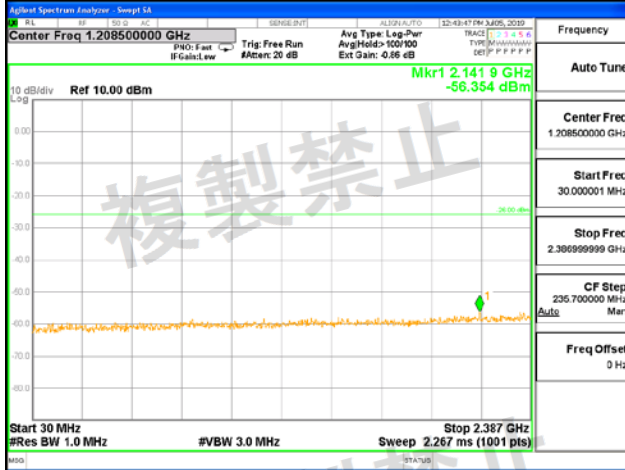
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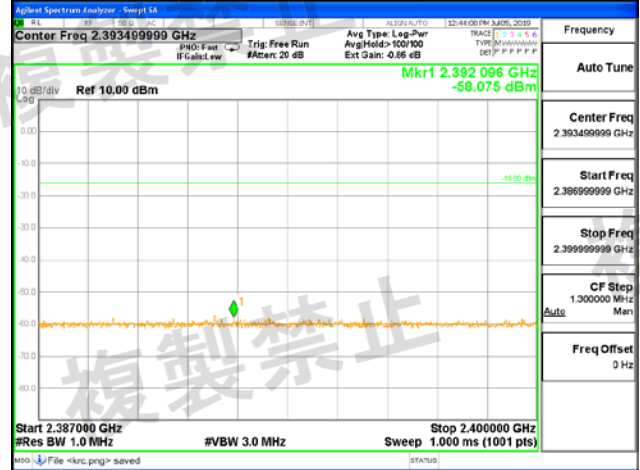
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Ch.19: 2440MHz

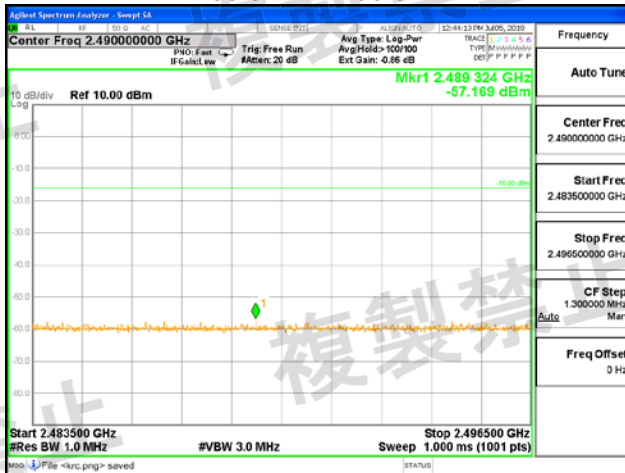
30MHz-2387MHz



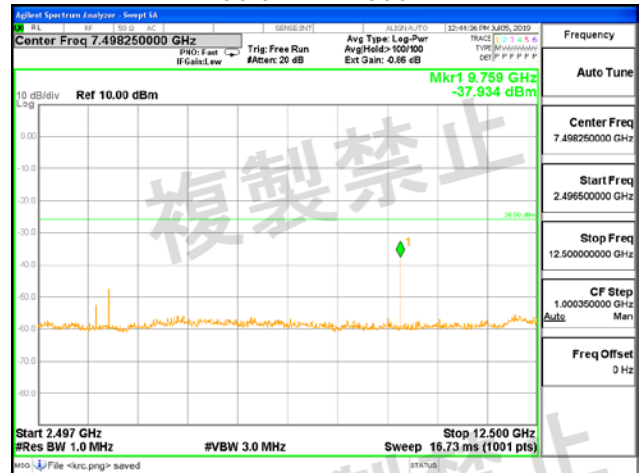
2387MHz-2400MHz



2483.5MHz-2496.5MHz



2496.5MHz-12500MHz





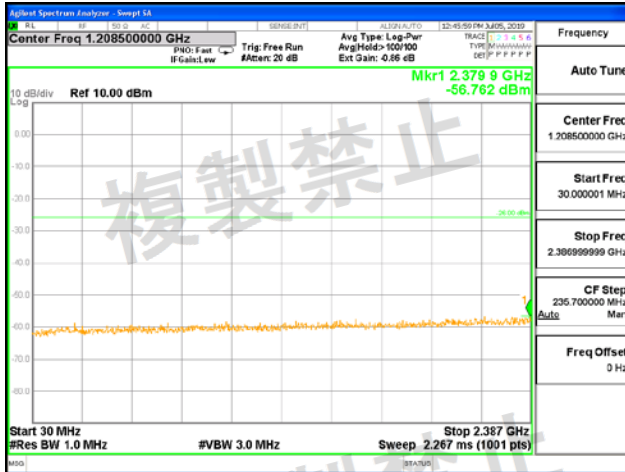
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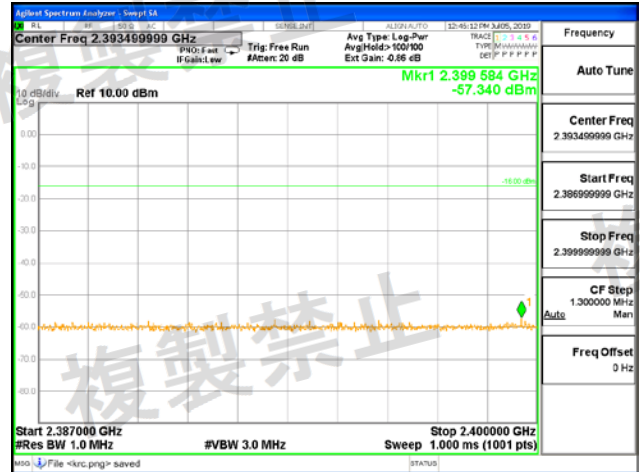
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Ch.39: 2480MHz

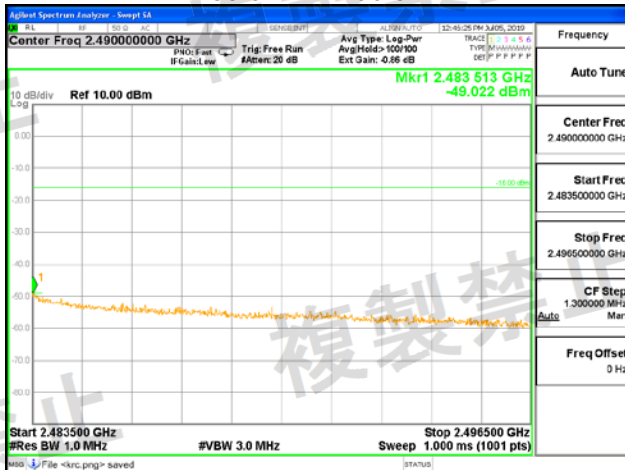
30MHz-2387MHz



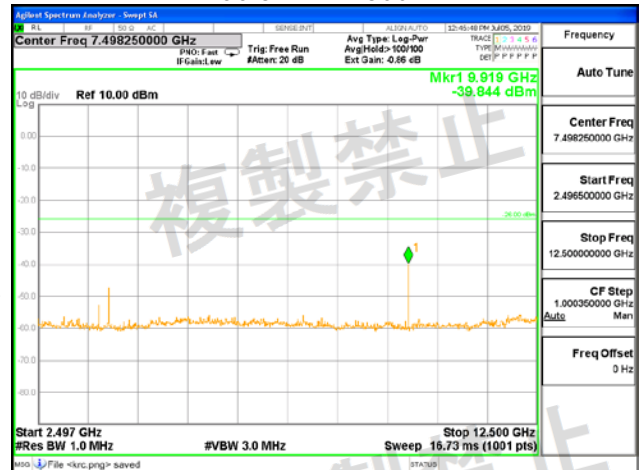
2387MHz-2400MHz



2483.5MHz-2496.5MHz



2496.5MHz-12500MHz





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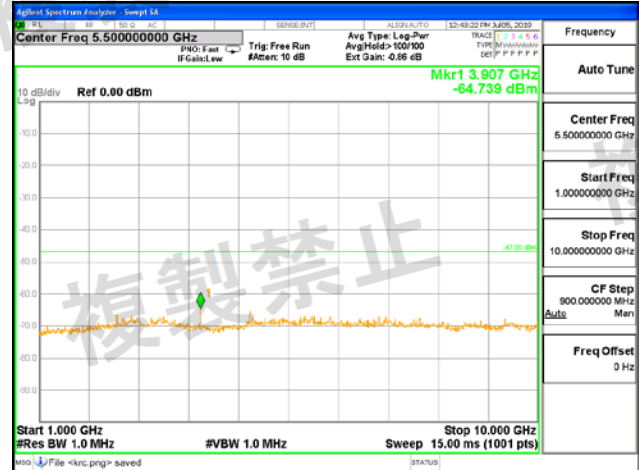
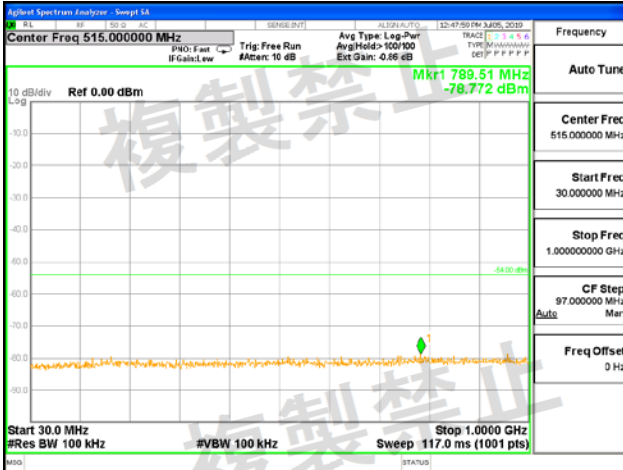
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CTK-2019-02553
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Secondary emitted radio wave strength

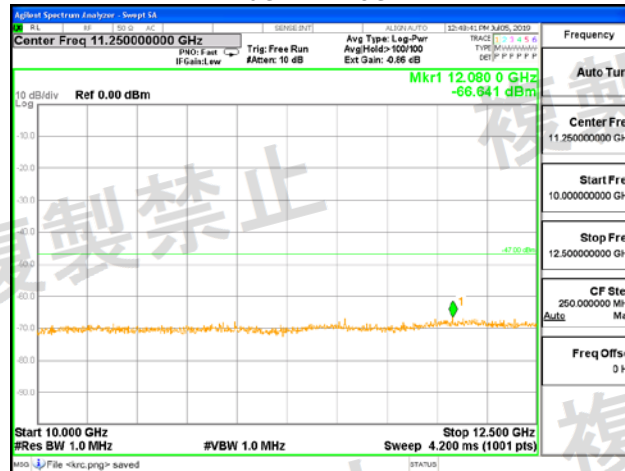
Ch.0: 2402MHz

30MHz-1GHz

1GHz-10GHz



10GHz-12.5GHz



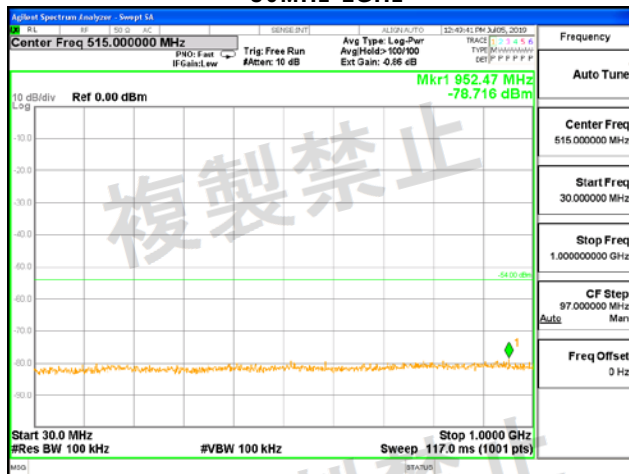


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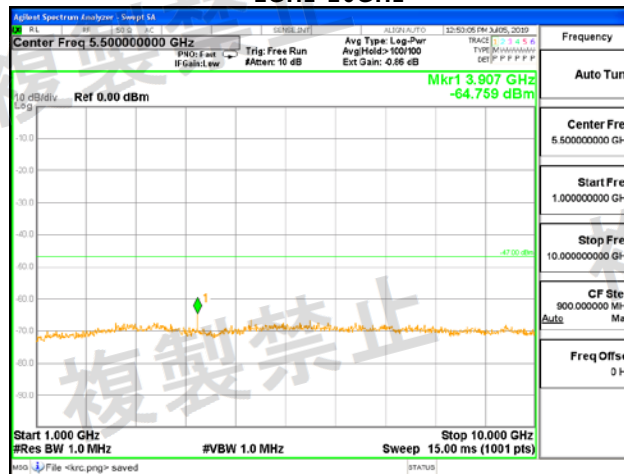
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Ch.19: 2440MHz

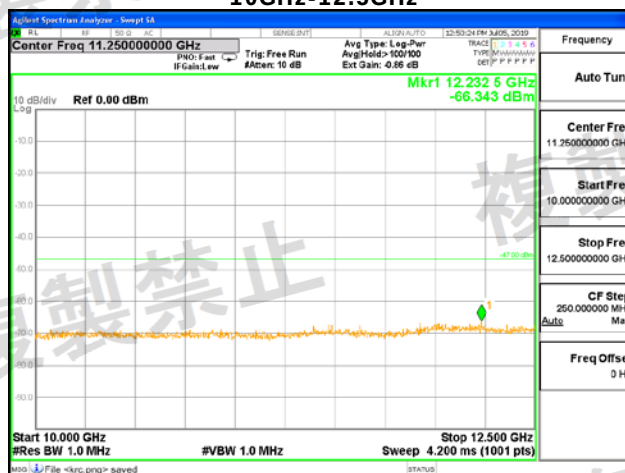
30MHz-1GHz



1GHz-10GHz



10GHz-12.5GHz





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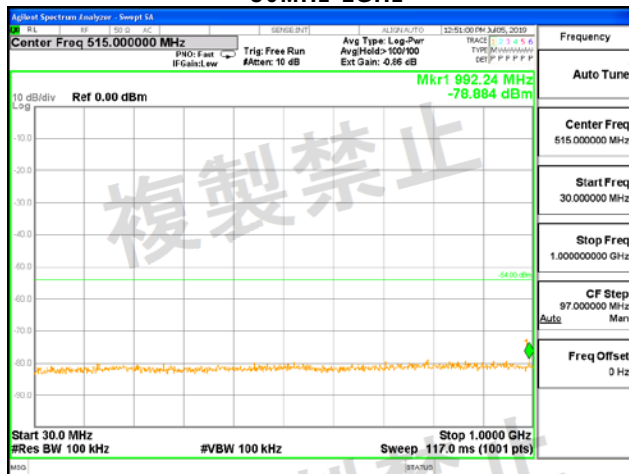
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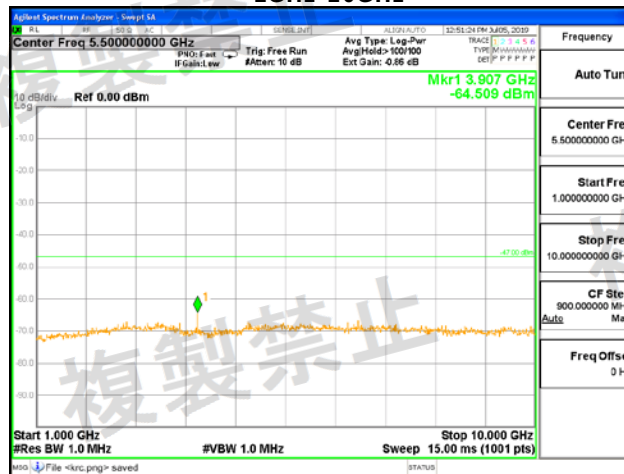
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Ch.39: 2480MHz

30MHz-1GHz



1GHz-10GHz



10GHz-12.5GHz

